

CLAIMS

What is claimed is:

1. A collapsible steering assembly comprising;
a steering mechanism,
at least one foot pedal moveable in operation between a fully retracted position and a fully depressed position for actuating an operating system in a vehicle, and
a support structure connecting said at least one pedal to said steering mechanism to define a unitized module, said support structure supporting said steering mechanism for collapsing movement in response to application of a predetermined collapse force to said steering mechanism, and further supporting said at least one pedal for collapsing along a predetermined collapse path beyond said fully depressed position in response to application of a predetermined collapse force to said at least one pedal.
2. An assembly as set forth in claim 1 wherein said at least one pedal is collapsible independently of said steering mechanism.
3. An assembly as set forth in claim 2 wherein said at least one pedal comprises a brake pedal.
4. An assembly as set forth in claim 3 wherein said steering mechanism includes a longitudinal steering axis extending transversely to the predetermined collapse path.

5. An assembly as set forth in claim 4 wherein said support structure includes a plurality of steering guide rods arranged about a common collapse axis in non-parallel relationship to said steering axis and interconnecting said brake pedal with said support structure and guiding movement of said brake pedal along the predetermined collapse path beyond the fully depressed position in response to application of the predetermined collapse force to said brake pedal.

6. An assembly as set forth in claim 4 wherein said support structure includes a plurality of steering guide rods arranged about a common collapse axis in non-parallel relationship to said steering axis and interconnecting said pedals and said steering mechanism and guiding said brake pedal along said predetermined collapse path.

7. An assembly as set forth in claim 6 including a pedal assembly carrying said pedals and disposed against said steering guide tubes for movement relative to said support structure in response to application of the predetermined collapse force to said steering mechanism.

8. An assembly as set forth in claim 7 wherein said pedal assembly includes a mounting assembly carrying said pedals and a hinge assembly interconnecting said mounting assembly and said support structure for permitting pivotal movement of said pedals relative to said support structure.

9. An assembly as set forth in claim 8 and including a plurality of steering shear elements interconnecting said steering guide rods and said support structure for preventing movement of said steering mechanism relative to said support structure and shearable in response to application of the predetermined collapse force on said steering mechanism for allowing said guide rods and said steering mechanism to move relative to said support structure.

10. An assembly as set forth in claim 9 wherein said steering guide rods are fixed relative to one another.

11. An assembly as set forth in claim 10 wherein said steering guide rods are straight.

12. An assembly as set forth in claim 11 wherein each of said steering guide rods comprises a steering tube extending from a front end to a rear end.

13. An assembly as set forth in claim 12 wherein each of said steering shear elements comprises a bushing surrounding each steering tube and engaging said support structure.

14. An assembly as set forth in claim 12 wherein said support structure includes a front bracket interconnecting said front ends of said steering tubes, an intermediate bracket, and a rear bracket supporting said rear ends of said steering tubes and said steering mechanism, said front and rear brackets being spaced from and on opposite sides of said intermediate bracket.

15. An assembly as set forth in claim 14 wherein said steering tubes comprise four tubes spaced from one another in a quadrangle.

16. An assembly as set forth in claim 14 wherein said rear bracket includes a connector for attachment to the vehicle.

17. An assembly as set forth in claim 14 wherein said rear ends of said steering tubes extend through said rear bracket.

18. An assembly as set forth in claim 12 including a knee bolster coupled to said support structure.

19. An assembly as set forth in claim 18 wherein said support structure includes a front bracket interconnecting said front ends of said steering tubes, an intermediate bracket, and a rear bracket supporting said rear ends of said steering tubes and said steering mechanism, said front and rear brackets, being spaced from and on opposite sides of said intermediate bracket.

20. An assembly as set forth in claim 19 including a plurality of bolster guide rods arranged about a second collapse axis and interconnecting said intermediate bracket and said knee bolster and supporting said knee bolster for axial movement along said second collapse axis in response to application of a second predetermined collapse force to said knee bolster.

21. An assembly as set forth in claim 20 and including a plurality of bolster shear elements interconnecting said bolster guide rods and said intermediate bracket for preventing movement of said knee bolster relative to said intermediate bracket and shearable in response to application of the second predetermined collapse force to said knee bolster for allowing said bolster guide rods and said knee bolster to move relative to said intermediate bracket.

22. An assembly as set forth in claim 21 wherein said intermediate bracket supports said bolster guide rods in fixed relationship to one another.

23. An assembly as set forth in claim 22 wherein said bolster guide rods are straight.

24. An assembly as set forth in claim 23 wherein each of said bolster guide rods comprises a tube.

25. An assembly as set forth in claim 24 wherein each of said bolster shear elements comprises a bushing surrounding each of said bolster tubes and engaging said intermediate bracket.

26. An assembly as set forth in claim 24 wherein said bolster tubes comprise four of said tubes spaced from one another in a quadrangle.

27. An assembly as set forth in claim 24 wherein said bolster tubes have front and rear ends, said knee bolster connected to said front ends of said bolster tubes and said rear bracket supporting said rear ends of said bolster tubes, said knee bolster and said rear bracket being spaced from and on opposite sides of said intermediate bracket.

28. An assembly as set forth in claim 27 wherein said intermediate bracket includes an upper block having bores therethrough with said steering tubes extending through said bores and a lower block having bores therethrough with said bolster tubes extending through said bores in said lower block.

29. An assembly as set forth in claim 28 including a second plurality of steering shear elements interconnecting said rear bracket and said steering tubes for preventing movement of said steering tubes relative to said rear bracket and shearable in response to application of the predetermined collapse force to the steering mechanism for allowing said steering tubes to move through said rear bracket.

30. An assembly as set forth in claim 24 including an energy absorber system for absorbing energy during movement of said steering mechanism and said pedal respectively relative to said intermediate bracket.

31. An assembly as set forth in claim 30 wherein said energy absorber system includes an anvil-strap device interconnecting said steering tubes and said upper block

32. An assembly as set forth in claim 24 wherein said bolster tubes are disposed in at least one pair on either side of said steering tubes.

33. An assembly as set forth in claim 32 wherein said bolster tubes are disposed transversely to said steering tubes.

34. An assembly as set forth in claim 33 including a connecting clamp interconnecting said rear ends of said bolster tubes, said bolster supported by said front ends of said bolster tubes.

35. An assembly as set forth in claim 34 wherein said energy absorber system includes an anvil-strap device interconnecting said clamp and said lower block for absorbing energy upon movement of said bolster tubes through said lower block in the crash condition.

36. An assembly as set forth in claim 35 wherein said steering tubes include an upper pair and a lower pair, a steering mechanism support bracket interconnecting said lower pair of tubes and supporting said steering mechanism.

37. An assembly as set forth in claim 36 including at least one beam interconnecting said upper block and said rear bracket to prevent relative movement therebetween.

38. An assembly as set forth in claim 31 wherein said energy absorber system includes a shear strap mechanism interconnecting said mounting assembly and said rear bracket for absorbing energy upon movement of said pedal assembly.

39. A collapsible steering assembly comprising;
a steering mechanism,
at least one foot pedal moveable in operation between a fully retracted position and a fully depressed position for actuating an operating system in a vehicle,

a knee bolster; and

a support structure connecting said at least one pedal to said steering mechanism and coupling said knee bolster therewith to define a unitized module, said support structure supporting said steering mechanism for collapsing movement in response to application of a predetermined collapse force to said steering mechanism, and further supporting said at least one pedal for collapsing along a predetermined collapse path beyond said fully depressed position in response to application of a predetermined collapse force to said at least one pedal and further supporting said knee bolster for collapsing along a collapse axis in response to application of a second predetermined collapse force to said knee bolster.